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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,150	11/24/2003	Frederick W. Kern Jr.	BUR920030085US1	1149
29625	7590	12/09/2005	EXAMINER	
MCGUIRE WOODS LLP 1750 TYSONS BLVD. SUITE 1800 MCLEAN, VA 22102-4215			MARKHAM, WESLEY D	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 12/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/707,150

Applicant(s)

KERN, FREDERICK W.

Examiner

Wesley D. Markham

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 9/13/05 (the RCE).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11-28 and 31-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-28 and 31-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application on 9/13/2005 after final rejection.

Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action (i.e., the final Office action mailed on 6/13/2005) has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/13/2005 has been entered.

Response to Amendment

2. Acknowledgement is made of the amendment filed by the applicant on 9/13/2005, in which Claims 1, 18, 24, 25, and 31 were amended, Claim 10 was canceled, and Claims 32 – 34 were added. **Claims 1 – 9, 11 – 28, and 31 – 34** are currently pending in U.S. Application Serial No. 10/707,150, and an Office action on the merits follows.

Drawings

3. The drawings (2 sheets) filed by the applicant on 10/14/2004 are acknowledged and approved by the examiner.

Claim Observations

4. In Claim 28, line 5, it appears that the word, "mechanism" should read, "mechanisms".
5. Please note that the 35 U.S.C. 102 and 103 rejections based solely on Olgado et al. (USPN 6,689,418), set forth in paragraphs 4 – 7 of the previous Office action, are withdrawn in light of the applicant's amendment to each of the independent claims, which now require accelerating the workpiece (e.g., in rotation) while the workpiece is gripped with all of the plurality of contacts / gripping mechanisms, and after the workpiece has reached a desired speed, alternately moving the contacts / gripping mechanisms and/or processing the workpiece, a limitation not taught by Olgado et al.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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7. Claims 1 – 9, 11 – 28, and 31 – 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Shimbara et al. (US 2004/0159343).
8. Regarding independent **Claims 1, 18, 25, and 31**, Shimbara et al. teaches a method for processing a workpiece (e.g., wafer “W”), comprising the steps of providing a plurality of contacts / gripping mechanisms (e.g., clamp pins “421”, “421-1” – “421-6” – see Figures 23 and 24(A); paragraphs [0309], [0310], and [0317]), accelerating the workpiece while the workpiece is gripped with all of the plurality of contacts / gripping mechanisms (paragraphs [0323] – [0325], [0332], [0333]), after the workpiece has reached a desired speed, alternately moving the plurality of contacts / gripping mechanisms (or moving alternate gripping mechanisms) between gripping positions and release positions away from and into contact with the workpiece and processing a surface of the workpiece with processing fluids to allow the processing fluids to freely flow, unimpeded, from a surface of the workpiece at previous locations of the released gripping mechanisms (paragraphs [0323] – [0342]). Such a process reads on a process in which each of the plurality of contacts is separately released from and moved into contact with the workpiece in a sequential order (paragraph [0039] or an alternating order (paragraphs [0317], [0318], and [0327]), as required by Claim 31. Also regarding independent Claim 31, as well as **Claims 32 – 34**, Shimbara et al. teaches keeping track, with a control “450”, of each of the plurality of contacts which are released and engaged with the workpiece (Figure 23; paragraphs [0322] – [0333]). Shimbara et al. also teaches that the plurality of contacts grip a periphery of the workpiece such that an upper and lower surface of the workpiece are exposed to

processing (**Claim 2**) (Figure 23; paragraphs [0325], [0328], [0330], and [0331]); the plurality of contacts comprises a first set of three contacts ("421-1", "421-3", and "421-5") and a second set of three contacts ("421-2", "421-4", and "421-6") that are moved into contact with and released from the workpiece in the alternating and/or sequential manner required by **Claims 3 – 8, 11, 12, 15, 17, 19 – 24, 27, and 28** (paragraphs [0327] – [0336]); the workpiece is rotating during the processing step (**Claim 9**) ([0327], [0332]); the plurality of contacts comprises five contacts, releasable in a predetermined sequence (**Claim 13**) ([0327], [0331], [0335] – [0342]); providing a processing fluid on a surface of the workpiece which is distributed on the surface by rotation of the workpiece (**Claims 14 and 26**) ([0328] – [0331]); and the processing step includes drying a surface of the workpiece (**Claim 16**) ([0332], [0333]).

9. Claims 1 – 5, 8, 9, 11 – 15, 17 – 20, and 22 – 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Liu (USPN 6,395,646).
10. Regarding independent **Claims 1 and 18**, Liu teaches a method for processing a workpiece (e.g., wafer "10"), comprising the steps of providing a plurality of contacts / gripping mechanisms (e.g., holding pins "34") for holding the workpiece (Figures 8 and 9; Col.2, lines 35 – 40); accelerating the workpiece (i.e., starting the rotation of the workpiece) while the workpiece is gripped with all of the plurality of contacts (Col.4, lines 5 – 11); after the workpiece has reached a desired speed (e.g., any speed), briefly releasing the edge of the substrate by the holding pins and then

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gripping the substrate again with the holding pins so that the wafer "10" shifts position (Col.4, lines 29 – 35), and processing a surface of the workpiece with processing fluids (Col.3, lines 5 – 20, Col.4, lines 11 – 40). The step of briefly releasing the workpiece from the holding pins and then gripping the workpiece again with the holding pins reads on "alternately moving the plurality of contacts between gripping positions and release positions" because all of the contacts are first gripping the workpiece, then released from the workpiece, and then gripping the workpiece again (i.e., are alternately moved between gripping and release positions).

Regarding independent **Claim 25**, the step of briefly releasing the workpiece from the holding pins and then gripping the workpiece again with the holding pins reads on "moving alternate gripping mechanisms of the plurality of gripping mechanisms away from and into contact with the workpiece during processing" because all of the holding pins (and, therefore, alternate holding pins) are first gripping the workpiece, then released from the workpiece, and then gripping the workpiece again (i.e., are moved away from and into contact with the workpiece during processing). Such a process step allows processing fluids to freely flow, unimpeded, from a surface of the workpiece at previous locations of the released gripping mechanisms, as recited in Claim 25 (Col.4, lines 29 – 35). Regarding **Claim 2**, the plurality of contacts grip a periphery of the workpiece such that an upper and lower surface of the workpiece are exposed to processing (Figures 8 – 10; Col.4, lines 1 – 19). Regarding **Claims 3 and 19**, any three of the six holding pins "34" of Liu (see Figure 8) constitute a "first set of three contacts / gripping mechanisms" and any other three of the six holding

pins constitute a “second set of three contacts / gripping mechanisms”. Regarding **Claims 4 and 20**, all of the holding pins are, at some point, in contact with the workpiece (i.e., the first set remains in contact with the workpiece), and all of the holding pins are, at some other point, released from the workpiece (i.e., the second set is released from the workpiece) (Col.3, lines 3 – 14, Col.4, lines 6 – 35).

Regarding **Claim 5**, all the contacts hold the workpiece (i.e., the first set holds the workpiece), and during the processing step, processing fluids are unimpeded to flow off a surface of the workpiece at the locations where all of the contacts, including the second set of contacts, are released therefrom (Col.4, lines 29 – 35). Regarding **Claims 8 and 22**, the contacts are located at first through sixth positions along the periphery of the workpiece (Figure 8). Regarding **Claim 9**, Liu teaches rotating the workpiece during the processing (Col.4, lines 5 – 35). Regarding **Claim 11**, all of the contacts are separately released from and moved into contact with the workpiece all at once (i.e., a sequence in which all the actions take place simultaneously).

Regarding **Claim 12**, the grip-release-grip method taught by Liu corresponds to an “alternating order” (i.e., alternating between gripping and releasing positions).

Regarding **Claim 13**, Liu teaches six contacts (Figure 8), which “comprises five contacts” because the transitional phrase “comprises” is open language. All the contacts are releasable at the same time (i.e., a “predetermined sequence”).

Regarding **Claims 14 and 26**, Liu teaches providing a processing fluid on a surface of the workpiece which is distributed by workpiece rotation (Col.4, lines 1 – 40).

Regarding **Claims 15 and 23**, all of the contacts (and therefore, at least one of the

contacts) are released for a predetermined amount of time and then moved into engagement with the workpiece for holding the workpiece (Col.3, lines 10 – 13, Col.4, lines 29 – 35). Regarding **Claim 17**, all six (and therefore, at least three) contacts hold the workpiece (Figure 8, Col.4, lines 5 – 10). Regarding **Claim 24**, all of the holding pins are separately released and moved into contact with the workpiece (Col.3, lines 10 – 13, Col.4, lines 29 – 35). Regarding **Claim 27**, Liu teaches that all six of the gripping mechanisms are moved (Col.3, lines 10 – 13, Col.4, lines 29 – 35), thereby inherently moving “non-adjacent gripping mechanisms” (i.e., because not all of the gripping mechanisms are adjacent to each other).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 3 – 8, 11 – 13, 16, 18 – 28, and 31 – 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu in view of Olgado et al. and either Harada (JP 04-186626 A) or Shinohara (JP 04-311034 A).

13. Liu teaches all the limitations of **Claims 3 – 8, 11 – 13, 18 – 28, and 31 – 34** as set forth above in paragraph 10, except for a method wherein the six holding pins “34” are alternately and/or sequentially moved toward and into contact with the workpiece

and away from (out of contact with) the workpiece in the claimed manner (i.e., a first set of three contacts at the first, third, and fifth positions along the periphery of the workpiece holds the workpiece during a first portion of the (fluid) processing, and then a second set of three contacts at the second, fourth, and sixth positions holds the workpiece during a second portion of the (fluid) processing, thereby allowing processing fluids to flow, unimpeded, off a surface of the workpiece at locations where the first and/or second set of contacts have been released therefrom).

Specifically, Liu teaches that all six of the holding pins are released simultaneously, thereby allowing the workpiece to be shifted during rotation and gripped at a different position (Col.4, lines 29 – 35). Liu's goal in allowing the wafer to be shifted during rotation is to insure that the entire wafer surface is treated with the processing solution (i.e., no portions are continuously masked by the holding pins) (Col.4, lines 29 – 35). Olgado et al. teaches an analogous process of treating a wafer with a processing solution (e.g., grabbing the wafer with a plurality of fingers, spinning the wafer, and applying a processing solution to the wafer while it is spinning – Title, Figure 2, Cols.4 – 6). Additionally, Olgado et al. teaches that the areas of the substrate edge that the fingers use to secure the substrate during the spinning operation are in mechanical contact with the fingers and thus may not be adequately exposed to the processing solution (Col.5, lines 58 – 61). This is the same problem that concerns Liu. To solve this problem, Olgado et al. teaches independently operating sets of fingers "72" and "73" so that fingers "72" grip the substrate during a portion of the process and alternate fingers "73" grip the substrate at different

locations during another portion of the process, the fingers being operated in the manner claimed by the applicant (i.e., a first set of three contacts at the first, third, and fifth positions along the periphery of the workpiece holds the workpiece during a first portion of the (fluid) processing, and then a second set of three contacts at the second, fourth, and sixth positions holds the workpiece during a second portion of the (fluid) processing, thereby allowing processing fluids to flow, unimpeded, off a surface of the workpiece at locations where the first and/or second set of contacts have been released therefrom) (Figures 2 and 3B; Col.3, lines 1 – 10, Col.5, line 58 – Col.6, line 14). Therefore, it would have been obvious to one of ordinary skill in the art to operate the six fingers of Liu in the manner taught by Olgado et al. (i.e., alternating fingers gripping the wafer at different times) during the wafer processing of Liu with the reasonable expectation of (1) success, as both Harada (Abstract, Figure 1) and Shinohara (Abstract, Figures 1, 2, 4, 5, and 8) teach that three contacts are sufficient to grip a wafer at its periphery during a wafer spinning / processing operation, and (2) obtaining similar results, i.e., insuring that all the wafer surfaces are treated and portions are not continuously masked by the holding pins, regardless of whether the substrate is shifted with respect to the holding pins (as taught by Liu) or the holding pins are alternately and/or sequentially moved into and out of contact with the workpiece periphery (as taught by Olgado et al. and claimed by the applicant). Additionally, one of ordinary skill in the art would have expected to reap an additional benefit by using the holding pin shifting process taught by Olgado et al., the benefit being improved process control (e.g., accurate wafer positioning)

due to the wafer being gripped by at least three holding pins at all times, thus insuring that the wafer does not inadvertently fly-off the rotating table or shift too much when all the holding pins are removed in the process of Liu. Regarding **Claim 16**, Liu does not explicitly teach that the processing includes drying the workpiece, but Olgado et al. teaches an analogous process in which substrate rotation is continued after the fluid processing is stopped to dry the substrate (Col.6, lines 37 – 44). It would have been obvious to one of ordinary skill in the art to spin dry the wafer of Liu after the fluid processing in order to insure that the etching solution used during the fluid processing step of Liu is completely removed from the wafer. Further regarding **Claims 31 – 34**, Olgado et al. teaches that fingers “72” and “73” are actuated while the substrate is spinning independent of the rotation by using well-known electric or pneumatic actuators (Col.6, lines 5 – 14), and a controller controls the timing of the various steps, including the steps of gripping the substrate with the first set of fingers, releasing the first set of fingers, and gripping the substrate with the second set of fingers, by transmitting control signals to the necessary components (i.e., the fingers) (Fig.2, Col.6, lines 29 – 33). This process control taught by Olgado et al. is reasonably interpreted to be equivalent to “keeping track, with a control, of each of the plurality of contacts which are released and engaged with the workpiece”, as required by the claims. For example, the controller of Olgado et al. determines which fingers (i.e., only the first set of fingers, only the second set of fingers, or both) are in contact (i.e., engaged) with the substrate and which fingers are not in contact with (i.e., released from) the substrate during each step of the

substrate processing. Thus, the controller “keeps track” of each of the plurality of contacts (i.e., the first set of fingers and the second set of fingers) which are released and engaged with the workpiece. If the controller of Olgado et al. did not, on some level, “keep track” of which set of fingers was engaged and which set was released during the process, the process of the combination of Liu and Olgado et al. could not be successfully carried out. In other words, the act of using a controller to insure that certain fingers are in contact with the substrate at certain periods of time and other fingers are in contact with the substrate at other periods of time, as taught by Olgado et al., constitutes keeping track of each of the contacts which are released and engaged with the workpiece

Response to Arguments

14. Applicant's arguments with respect to the pending claims have been fully considered but are moot in view of the new ground(s) of rejection set forth above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamasaki et al. (USPN 6,683,007) (Cols.13 – 14), Kuroda (US 2003/0098048), Donoso et al. (US 2004/0206373) (paragraphs [0046] – [0059]), Ivanov et al. (USPN 6,935,639), and Yonemizu et al. (USPN 5,958,145) (Col.6) all teach substrate holding devices designed to secure a substrate that is processed while rotating.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D. Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


WDM

Wesley D Markham
Examiner
Art Unit 1762


TIMOTHY MEEKS
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